CLAIMS

WHAT IS CLAIMED IS:

1. A sensing system for a vehicle passenger restraint system, comprising:

a plurality of sensors;

a controller having a plurality of sensor modules, each sensor module corresponding to one of said plurality of sensors and generating a fire request that is considered by the controller in determining whether to generate the fire signal, wherein the controller generates a fire signal based on information generated by at least two of the sensor modules,

said at least one sensor module containing a plausibility check algorithm, wherein the controller sends the fire signal if a first sensor sends a fire request and if the plausibility check algorithm corresponding to a second sensor indicates that a crash event is plausible; and

a deployment device that deploys a restraint in response to the fire signal.

2. The sensing system of claim 1, wherein the controller selects the second sensor to be a sensor that is likely to react with the first sensor in response to the crash event.

3. The sensing system of claim 1, further comprising a status field having a plurality of plausibility flags, wherein the plausibility check flag for a given sensor is set if data from the sensor exceeds a plausibility threshold.

4. The sensing system of claim 3, wherein the plurality of plausibility flags are in a parameterable plausibility path that allows calibration of said plurality of plausibility flags to include at least one of a watched plausibility flag and an ignored plausibility flag. .

5. The sensing system of claim 1, wherein the first sensor and the second sensor are different sensors.

6. The sensing system of claim 1, wherein the plurality of sensors are symmetrically arranged in at least one row, each row containing a driver side sensor and a passenger side sensor.

7. The sensing system of claim 1, wherein at least one sensor module comprises a fire/no-fire discrimination algorithm used to decide whether to output a fire request, wherein the controller generates the fire signal based at least in part on the fire request.

8. The sensing system of claim 7, wherein the fire/no-fire discrimination algorithm comprises:

a first mode that evaluates a sensor output with respect to at least one threshold; and

a second mode that evaluates a velocity change based on the sensor output with respect to a dynamic threshold,

wherein at least one of the first and second mode generate a fire request that is considered by the controller in determining whether to generate the fire signal.

9. The sensing system of claim 8, wherein the sensor output is an acceleration signal, and wherein the first mode generates a fire request if a height and width of the acceleration signal exceeds height and width thresholds, respectively.

10. The sensing system of claim 8, wherein the sensor output is a pressure signal, and wherein the first mode generates a fire request if a relative pressure change exceeds at least one of a fixed and a dynamic threshold.

11. The sensing system of claim 8, wherein the sensor output is a pressure signal, and wherein the first mode generates a fire request if a mean pressure exceeds a dynamic threshold and if a differential pressure exceed a fixed threshold.

12. The sensing system of claim 8, wherein the dynamic threshold is variable based on a plurality of terms.

13. The sensing system of claim 1, wherein at least one sensor module further comprises a transmission check algorithm to check whether the sensor module is receiving valid sensor data from its corresponding sensor.

14. The sensing system of claim 13, wherein the transmission check algorithm comprises a counter that increments when the sensor data exceeds a transmission check threshold, and wherein the transmission check algorithm sets a transmission check flag used to determine whether to send the fire request when the counter reaches a counter threshold.

15. The sensing system of claim 14, wherein the transmission check algorithm sets the transmission check flag when the counter reaches a counter threshold within a selected time window.

16. The sensing system of claim 8, wherein one of the terms used in the second mode is a correlation acceleration difference (CAD), and wherein the system further comprises a CAD algorithm that calculates a CAD term reflecting a difference between data from a driver side sensor and a passenger side sensor in one row.

17. The sensing system of claim 16, wherein the CAD term is a difference between absolute values of driver side sensor data and passenger side sensor data integrated over a time window.

18. The sensing system of claim 1, wherein the controller checks a restraint deployment status on a driver side and a passenger side, and wherein the controller runs at least one algorithm in at least one sensor module on a non-deployed side if one of the driver and passenger sides have been deployed and stops algorithm operation if both sides have been deployed.

19. The sensing system of claim 18, wherein the controller further compares a driver side velocity change and a passenger side velocity change and runs said at least one algorithm on the side having the higher velocity change in a crash direction.

20. A sensing system for a vehicle passenger restraint system, comprising:

a plurality of sensors symmetrically arranged in at least one row, each row containing a driver side sensor and a passenger side sensor;

a controller having a plurality of sensor modules, each sensor module corresponding to one of said plurality of sensors and generating a fire request that is considered by the controller in determining whether to generate the fire signal,

said at least one sensor module containing

a fire/no-fire discrimination algorithm used to decide whether to output a fire request,

a plausibility check algorithm that controls a plausibility flag in a status field having a plurality of plausibility flags, wherein the plausibility flag for a given sensor is set if data from the sensor exceeds a plausibility threshold,

a transmission check algorithm to check whether the sensor module is receiving valid sensor data from its corresponding sensor, wherein the transmission check algorithm comprises a counter that increments when the sensor data exceeds a transmission check threshold, and wherein the transmission check algorithm sets a transmission check flag used to determine whether to send the fire request when the counter reaches a counter threshold, and

a correlation acceleration difference (CAD) algorithm that calculates a CAD term reflecting a difference between data from a driver side sensor and a passenger side sensor in one row,

wherein the controller sends the fire signal if a first sensor sends a fire request and if a plausibility flag corresponding to a second sensor indicates that a crash event is plausible; and

a deployment device that deploys a restraint in response to the fire signal.

21. The sensing system of claim 20, wherein the plurality of plausibility flags are in a parameterable plausibility path that allows calibration of said plurality of plausibility flags to include at least one of a watched plausibility flag and an ignored plausibility flag.

22. The sensing system of claim 20, wherein the second sensor is a sensor that has been predetermined to be likely to react with the first sensor in response to the crash event.

23. The sensing system of claim 20, wherein the fire/no-fire discrimination algorithm comprises:

a first mode that evaluates a sensor output with respect to at least one threshold; and

a second mode that evaluates a velocity change based on the sensor output with respect to a dynamic threshold that is variable based on a plurality of terms,

wherein at least one of the first and second mode generate a fire request that is considered by the controller in determining whether to generate the fire signal.

24. The sensing system of claim 23, wherein the sensor output is an acceleration signal, and wherein the first mode generates a fire request if a height and width of the acceleration signal exceeds height and width thresholds, respectively.

25. The sensing system of claim 23, wherein the sensor output is a pressure signal, and wherein the first mode generates a fire request if a relative pressure change exceeds at least one of a fixed and a dynamic threshold.

26. The sensing system of claim 23, wherein the sensor output is a pressure signal, and wherein the first mode generates a fire request if a mean pressure exceeds a dynamic threshold and if a differential pressure exceed a fixed threshold.

27. The sensing system of claim 20, wherein the transmission check algorithm sets the transmission check flag when the counter reaches a counter threshold within a selected time window.

28. The sensing system of claim 20, wherein the CAD term is a difference between absolute values of driver side sensor data and passenger side sensor data integrated over a time window.

29. The sensing system of claim 20, wherein the controller checks a restraint deployment status on a driver side and a passenger side, and wherein the controller runs at least one algorithm in at least one sensor module on a non-deployed side if one of the driver and passenger sides have been deployed and stops at least one algorithm operation if both sides have been deployed.

30. The sensing system of claim 29, wherein the controller further compares a driver side velocity change and a passenger side velocity change and runs said at least one algorithm on the side having the higher velocity change.

31. A discrimination method for a vehicle passenger restraint system having a plurality of sensors, comprising:

detecting a fire request corresponding to a first sensor, wherein the fire request is generated when a first sensor output reaches a fire request threshold;

detecting a plausibility flag corresponding to a second sensor, wherein the plausibility flag is set when a second sensor output reaches a plausibility threshold; and

generating a fire signal when the fire request and the plausibility flag are detected, indicating a crash event; and

deploying a restraint in response to the fire signal.

32. The method of claim 31, wherein the plurality of plausibility flags are in a parameterable plausibility path that allows calibration of said plurality of plausibility flags to include at least one of a watched plausibility flag and an ignored plausibility flag.

33. The method of claim 31, wherein the second sensor is predetermined to be a sensor that is likely to react with the first sensor in response to the crash event.

34. The method of claim 31, wherein the fire request is generated by:

evaluating a sensor output with respect to at least one threshold; and

evaluating a velocity change based on the sensor output with respect to a dynamic threshold.

35. The method of claim 34, wherein the sensor output is an acceleration signal, and the fire request is generated if a height and width of the acceleration signal exceeds height and width thresholds, respectively.

36. The method of claim 34, wherein the sensor output is a pressure signal, and wherein the fire request is generated if a relative pressure change exceeds at least one of a fixed and a dynamic threshold.

37. The method of claim 34, wherein the sensor output is a pressure signal, and wherein the fire request is generated if a mean pressure exceeds a dynamic threshold and if a differential pressure exceed a fixed threshold.

38. The method of claim 31, further comprising conducting a transmission check to check whether the sensor module is receiving valid sensor data from its corresponding sensor, wherein the transmission check is conducted by

incrementing a counter when the sensor data exceeds a transmission check threshold; and

setting a transmission check flag used to determine whether to send the fire request when the counter reaches a counter threshold.

39. The method of claim 38, wherein the transmission check flag is set when the counter reaches a counter threshold within a selected time window.

40. The method of claim 31, further comprising calculating a correlation acceleration difference term reflecting a difference between data from a driver side sensor and a passenger side sensor in one row.

41. The method of claim 40, wherein the CAD term is calculated by integrating a difference between absolute values of driver side sensor data and passenger side sensor data over a time window.

42. The method of claim 31, further comprising:

checking a restraint deployment status on a driver side and a passenger side;

running at least one algorithm on a non-deployed side if one of the driver and passenger sides have been deployed; and

stopping at least one algorithm operation if both sides have been deployed.

43. The method of claim 42, further comprising:

comparing a driver side velocity change and a passenger side velocity change; and running said at least one algorithm on the side having the higher velocity change.